

## Neotropical Monogenoidea. 34. Species of *Demidospermus* (Dactylogyridae, Ancyrocephalinae) from the Gills of Pimelodids (Teleostei, Siluriformes) in Argentina

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**ABSTRACT:** The diagnosis of *Demidospermus* Suriano, 1983, is emended, and 9 species (5 new) are described or reported from the gills of 4 species of Pimelodidae (Siluriformes) from Argentina: *D. armostus* sp. n. from *Pimelodus albicans* and *Pimelodus clarias*; *D. bidiverticulatum* (Suriano and Incorvaia, 1995) comb. n. from *Pimelodus clarias* and *P. albicans* (new host record); *D. cornicinus* and *D. leptosynophallus* spp. n. from *Iheringichthys westermanni*; *D. idolus* and *D. majusculus* spp. n. from *Pimelodus albicans*; *D. paravalencienesi* Gutiérrez and Suriano, 1992, and *D. uncusvalidus* Gutiérrez and Suriano, 1992, from *Pimelodus clarias*; and *D. valenciennesi* Gutiérrez and Suriano, 1992, from *Parapimelodus valenciennesi*. *Omothecium* Kritsky, Thatcher and Boeger, 1987, and *Paramphocleithrium* Suriano and Incorvaia, 1995, are considered junior synonyms of *Demidospermus*.

**KEY WORDS:** Monogenoidea, Dactylogyridae, Ancyrocephalinae, *Demidospermus*, *Demidospermus armostus* sp. n., *Demidospermus bidiverticulatum* comb. n., *Demidospermus cornicinus* sp. n., *Demidospermus idolus* sp. n., *Demidospermus leptosynophallus* sp. n., *Demidospermus majusculus* sp. n., *Demidospermus paravalencienesi*, *Demidospermus uncusvalidus*, *Demidospermus valenciennesi*, *Omothecium*, *Paramphocleithrium*, Siluriformes, Pimelodidae, *Iheringichthys westermanni*, *Parapimelodus valenciennesi*, *Pimelodus albicans*, *Pimelodus clarias*, Río de la Plata, Argentina.

*Demidospermus* was proposed by Suriano (1983) for *D. anus*, a previously undescribed species from the gills of *Loricaria anus* (Loricariidae) in Argentina. Suriano (1983) identified the presence of “partially encapsulated” sperm in the testis of the adult worm as the principal diagnostic character for the genus. Gutiérrez and Suriano (1992) added generic characters, labeled encapsulated sperm, as “sperm packets” (although not always visible in their specimens [Gutiérrez, unpubl.]) and described 3 new species: *D. valenciennesi* from *Parapimelodus valenciennesi* (Pimelodidae); *D. paravalencienesi* from *Pimelodus clarias* (Pimelodidae); and *D. uncusvalidus* from *P. clarias* and *Parauchenipterus galeatus* (Auchenipteridae). In the present study, 9 species of *Demidospermus* (5 new) are described and/or reported from the gills of 4 pimelodid hosts from Argentina. *Omothecium* Kritsky, Thatcher and Boeger, 1987, and *Paramphocleithrium* Suriano and Incorvaia, 1995, both containing species from Neotropical pimelodid hosts, are placed in synonymy with *Demidospermus*.

### Materials and Methods

Hosts (*Iheringichthys westermanni* [Reinhardt], *Parapimelodus valenciennesi* [Kröyer], *Pimelodus albicans* [Valenciennes], and *Pimelodus clarias* [Lacépède]) were collected by net from the Río de la Plata and Río Uruguay in eastern Argentina during January through March 1994. Methods of parasite collection, preservation, preparation for study, measurement, and illustration are those of Kritsky et al. (1986, 1996). Measurements, in micrometers, represent straight-line distances between extreme points and are expressed as the mean followed by the range and number (*n*) of specimens measured in parentheses; lengths of the copulatory organ and haptor bar are approximations of total lengths obtained by using a Minerva curvimeter on camera lucida drawings. Numbering (distribution) of hook pairs follows that of Mizelle (1936; see Mizelle and Price, 1963) for adult dactylogyrids. Type and voucher specimens of helminths are deposited in the parasite collections of the Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (MACN); the United States National Parasite Collection, Beltsville, Maryland (USNPC); and the University of Nebraska State Museum (HWML), as indicated in the respective descriptions or accounts of species. In addition, the following specimens were examined: 3 vouchers of *Demidospermus anus* Suriano, 1983 (USNPC 87159); 3 paratypes of *Omothecium pinirampi* Kritsky, Boeger and Thatcher, 1987 (USNPC 78798); 2 paratypes of *O. luckyi* Kritsky, Boeger and Thatcher, 1987 (USNPC 78795, HWML 22973).

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## Results

### Subclass Polyonchoinea Bychowsky, 1937

#### Order Dactylogyridea Bychowsky, 1937

##### Dactylogyridae Bychowsky, 1933

##### Ancyrocephalinae Bychowsky, 1937

##### *Demidospermus* Suriano, 1983

SYNONYMS: *Omothecium* Kritsky, Thatcher and Boeger, 1987; *Paramphocleithrium* Suriano and Incorvaia, 1995.

DIAGNOSIS: Body fusiform, comprising cephalic region, trunk, peduncle, haptor. Tegument thin, smooth. Two terminal, 2 bilateral cephalic lobes; head organs present; cephalic glands unicellular, lateral or posterolateral to pharynx. Eyes present (2 pairs) or absent; granules subspherical. Mouth subterminal, midventral; pharynx muscular, glandular; esophagus present; intestinal ceca 2, confluent posterior to gonads, lacking diverticula. Genital pore midventral near level of intestinal bifurcation. Gonads intercecal, tandem; testis postgermarial. Vas deferens looping left intestinal cecum; seminal vesicle a dilation of vas deferens. Copulatory complex comprising tubular male copulatory organ (MCO) coiled or not, accessory piece; coil (when present) of MCO counterclockwise. Accessory piece sheathlike, serving as guide for MCO. Seminal receptacle pregermarial. Vaginal aperture sinistral; vagina nonsclerotized with distal variably sclerotized vestibule. Vitellaria coextensive with intestine. Haptor subhexagonal, with dorsal and ventral anchor/bar complexes, 7 pairs of hooks; hook distribution ancyrocephaline; hooks variable. Bars elongate, V, W, or U shaped. Parasites of gills of Neotropical siluriform fishes (reported from the Loricariidae, Pimelodidae, and Auchenipteridae).

TYPE SPECIES: *Demidospermus anus* Suriano, 1983, from *Loricaria anus* (Loricariidae).

OTHER SPECIES: *Demidospermus armostus* sp. n. from *Pimelodus albicans* and *P. claras* (Pimelodidae); *D. bidiverticulatum* (Suriano and Incorvaia, 1995) comb. n. from *Pimelodus claras*, *P. c. maculatus*, and *P. albicans* (all Pimelodidae); *D. cornicinus* sp. n. from *Iheringichthys westermanni* (Pimelodidae); *D. idolus* sp. n. from *Pimelodus albicans* (Pimelodidae); *D. leptosynophallus* sp. n. from *Iheringichthys westermanni* (Pimelodidae); *D. luckyi* (Kritsky, Thatcher and Boeger, 1987) comb. n. from *Pinirampus pirinampu* (Pimelodidae); *D. majusculus* sp. n. from *Pimelodus albicans* (Pimelod-

idae); *D. paravalencienensis* Gutiérrez and Suriano, 1992, from *P. claras* (Pimelodidae); *D. pinirampi* (Kritsky, Thatcher and Boeger, 1987) comb. n. from *Pinirampus pirinampu* (Pimelodidae); *D. uncusvalidus* Gutiérrez and Suriano, 1992, from *Pimelodus claras* (Pimelodidae) and *Parauchenipterus galeatus* (Auchenipteridae); and *D. valenciennesi* Gutiérrez and Suriano, 1992, from *Parapimelodus valenciennesi* (Pimelodidae).

REMARKS: The emended diagnosis characterizes *Demidospermus* with species having (1) tandem gonads (testis postgermarial); (2) a counterclockwise coiled MCO; (3) a sinistral vaginal aperture; (4) U-, W-, or V-shaped haptoral bars; (5) subspherical eye granules; and (6) a sheathlike accessory piece serving as a guide for the MCO. Suriano (1983) considered the presence of encapsulated sperm (sperm packets) within the testis of adult worms an autapomorphic feature of the genus. Since sperm packets are not always present or visible in some specimens of previously described species (Gutiérrez, unpubl.) and they have not been observed in any of our specimens, this character is not reliable in defining the genus.

Although considered diagnostic for *Demidospermus* by Suriano (1983) and Gutiérrez and Suriano (1992), the presence/absence and number of prostatic reservoirs in species of *Demidospermus* are not included in the present diagnosis. The reservoirs did not stain nor were they observed consistently in available specimens. At the present time, we do not feel that these reservoirs are diagnostic.

*Omothecium* contains 2 species, *O. luckyi* and *O. pinirampi*, from the gills of a pimelodid host from the Amazon Basin. In their diagnosis, Kritsky et al. (1987) characterized this genus with the following features: a vagina opening on the left margin of the trunk near the level of the copulatory complex; tandem gonads (testis postgermarial); "unmodified" anchors and bars; undilated hook shanks; and a clockwise MCO. These features no longer justify separation of this genus from *Demidospermus*. The vagina in all species of *Demidospermus* opens on the left margin of the trunk and, in some species (e.g., *D. armostus* sp. n.), the opening is near the level of the copulatory complex. Characters associated with the gonads and haptoral sclerites are not inconsistent with those present in species of *Demidospermus*. Lastly, our examination of the

paratypes of *O. luckyi* and *O. pinirampi* confirm that the ring of the MCO is counterclockwise. Because no distinguishing features remain, we consider *Omothecium* a junior synonym of *Demidospermus*, and the following new combinations are proposed: *D. luckyi* (Kritsky, Thatcher and Boeger, 1987) comb. n. and *D. pinirampi* (Kritsky, Thatcher and Boeger, 1987) comb. n.

Suriano and Incorvaia (1995) proposed the monotypic *Paramphocleithrium* for their new species, *P. bidiverticulatum*, from the gills of *Pimeodus clarias maculatus* in Argentina. The genus was characterized by the presence of 2 intestinal diverticula extending into the haptor. *Paramphocleithrium bidiverticulatum* was said to lack sperm packets and possess 2 prostatic reservoirs. The authors also suggested that the comparative morphology of the sclerotized components of the haptor could be used to differentiate *Paramphocleithrium* from *Demidospermus*. The "intestinal diverticula" described by Suriano and Incorvaia (1995) are actually large bilateral muscles extending from the peduncular region into the haptor and are not attached to the gut (see the redescription of *D. bidiverticulatum*). In *Demidospermus* spp., the number of prostatic reservoirs varies and sperm packets are not always visible, and Gutiérrez (unpubl.) has observed sperm packets in some specimens of *P. bidiverticulatum*. Further, morphology of the haptoral sclerites of *P. bidiverticulatum* does not exclude this species from *Demidospermus*. Thus, we consider *Paramphocleithrium* a junior synonym of *Demidospermus* since the autapomorphic character and other characters used by Suriano and Incorvaia (1995) to define the genus are either erroneous or fall within the observed variation of *Demidospermus*. *Demidospermus bidiverticulatum* (Suriano and Incorvaia, 1995) comb. n. is proposed.

*Demidospermus* resembles several other genera with species infesting gills of Neotropical siluriform fishes: *Amphocleithrium* Price and Romero, 1969, *Cosmetocleithrum* Kritsky, Thatcher and Boeger, 1986, *Philocorydoras* Suriano, 1986, *Unibarra* Suriano and Incorvaia, 1995, and *Vancleaveus* Kritsky, Thatcher and Boeger, 1986. In *Demidospermus* species, the gonads are tandem (overlapping in *Vancleaveus* and *Philocorydoras* spp.); the dorsal bar lacks 2 posteriorly directed submedial projections (present in *Cosmetocleithrum* spp.); the haptor is armed with 2 elongate, V-, W-, or U-shaped bars

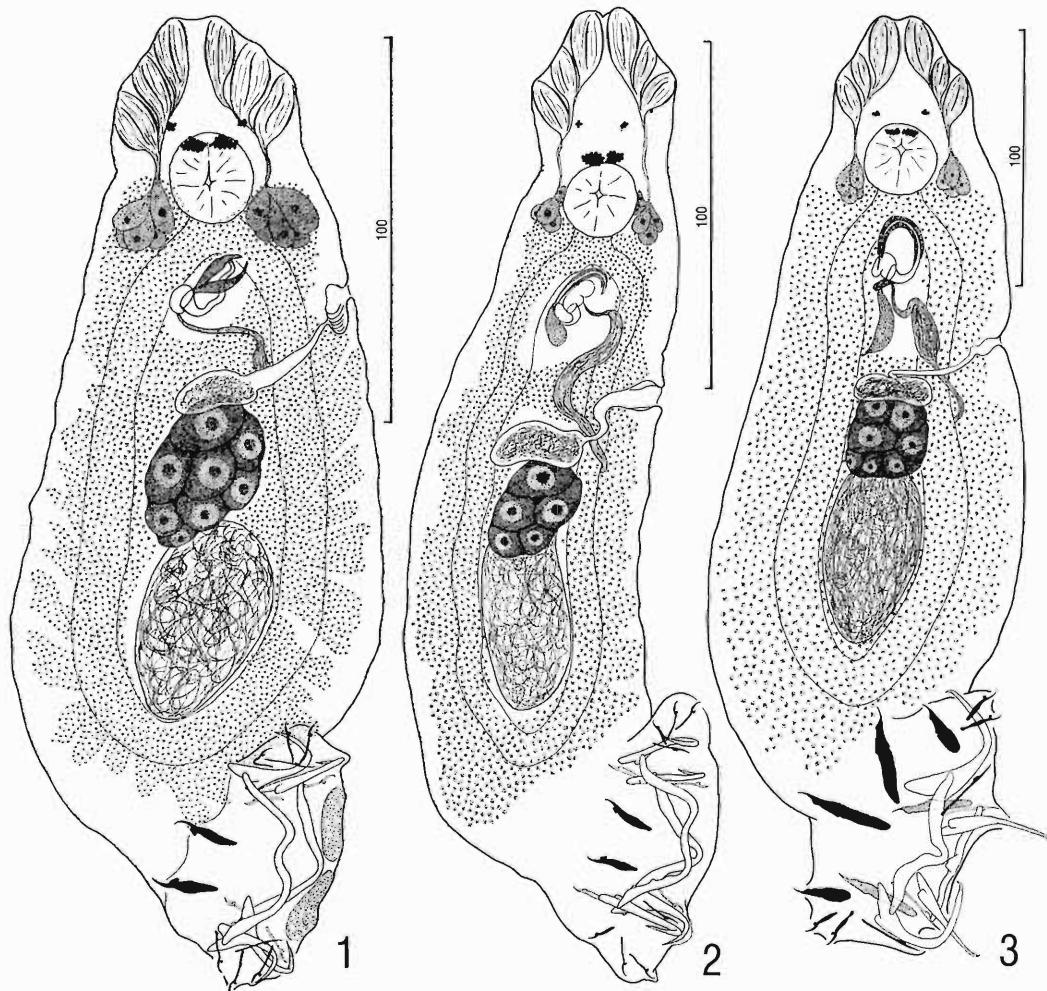
(dorsal bar absent in *Unibarra* spp.; bars straight in *Unibarra* and *Amphocleithrium* spp.).

### *Demidospermus armostus* sp. n. (Figs. 1, 4–12)

HOST AND LOCALITY: Gills of *Pimeodus clarias*: Río de la Plata near Buenos Aires, Argentina (28 February 1994; 24 March 1994).

SPECIMENS STUDIED: Holotype, USNPC 87143; 17 paratypes, USNPC 87144, HWML 39346, MACN 34113/A27.

DESCRIPTION: Body 248 (212–307;  $n = 7$ ) long, fusiform; greatest width 92 (87–99;  $n = 7$ ) in posterior trunk. Cephalic lobes poorly developed. Eyes 4; posterior pair larger, closer together than anterior pair; accessory granules uncommon or absent. Pharynx spherical, 21 (19–23;  $n = 9$ ) in diameter; esophagus short. Peduncle broad; haptor subhexagonal, 75 (69–82;  $n = 7$ ) wide, 49 (43–56;  $n = 8$ ) long, with 2 bilateral glandular patches along posterior border. Anchors similar; each with broad base, short shaft, elongate point; ventral anchor 21 (20–22;  $n = 6$ ) long, base 14 (13–16;  $n = 5$ ) wide; dorsal anchor 21–22 ( $n = 7$ ) long, base 13 (12–14;  $n = 5$ ) wide. Ventral bar 66 (60–73;  $n = 13$ ) long, U or W shaped; distance between ends 45 (39–59;  $n = 14$ ). Dorsal bar 57 (50–63;  $n = 8$ ) long, V shaped; distance between ends 33 (21–43;  $n = 14$ ). Hook pair 1–22 (21–24;  $n = 8$ ) long, pair 2–13 (12–14;  $n = 3$ ) long, pairs 3–7–16 (15–17;  $n = 11$ ) long; hook pair 1 with recurved point, heavy shaft, flattened thumb, variably expanded shank; hook pairs 5, 6 with straight point, tapered shaft, depressed or flattened thumb, thin shank; hook pairs 2–4, 7 delicate throughout, point recurved, thumb erect; FH loop 1/2 shank length in pair 1, approaching shank length in remaining pairs. MCO 16 (14–18;  $n = 8$ ) long, an elongate cone, sigmoid distally, base with sclerotized margin, delicately sclerotized proximal double bag. Accessory piece 14 (12–15;  $n = 5$ ) long, bifurcating at mid-length. Gonads subovate. Testis 41 (22–53;  $n = 7$ ) long, 24 (18–32;  $n = 6$ ) wide; proximal vas deferens not observed; seminal vesicle indistinct; prostatic reservoir(s) not observed. Ovary 35 (31–44;  $n = 7$ ) long, 23 (18–27;  $n = 7$ ) wide; oviduct, ootype, uterus not observed. Vaginal aperture near level of copulatory complex; vaginal vestibule with ridges in posterior wall; vaginal canal opening into small medial seminal receptacle. Vitellaria dense.



**Figures 1–3.** Whole mount illustrations of species of *Demidospermus* (composite, ventral). 1. *Demidospermus armostus* sp. n. 2. *Demidospermus paravalenciennesi* Gutiérrez and Suriano, 1992. 3. *Demidospermus uncusvalidus* Gutiérrez and Suriano, 1992. Drawings are to respective 100- $\mu\text{m}$  scales.

**REMARKS:** *Demidospermus armostus* differs from congeneric species by possessing a comparatively short MCO with a sigmoid termination. Based on comparative morphology of the anchors, bars, and hook pair 1, *D. armostus* is most similar to *D. valenciennesi* and *D. idolus* sp. n. In the latter 2 species, hook pair 2 has a slightly expanded shank (lacking in *D. armostus*). The specific name is from Greek (*armostos* = suitable) and refers to the apparent relationship of this species with others in the genus.

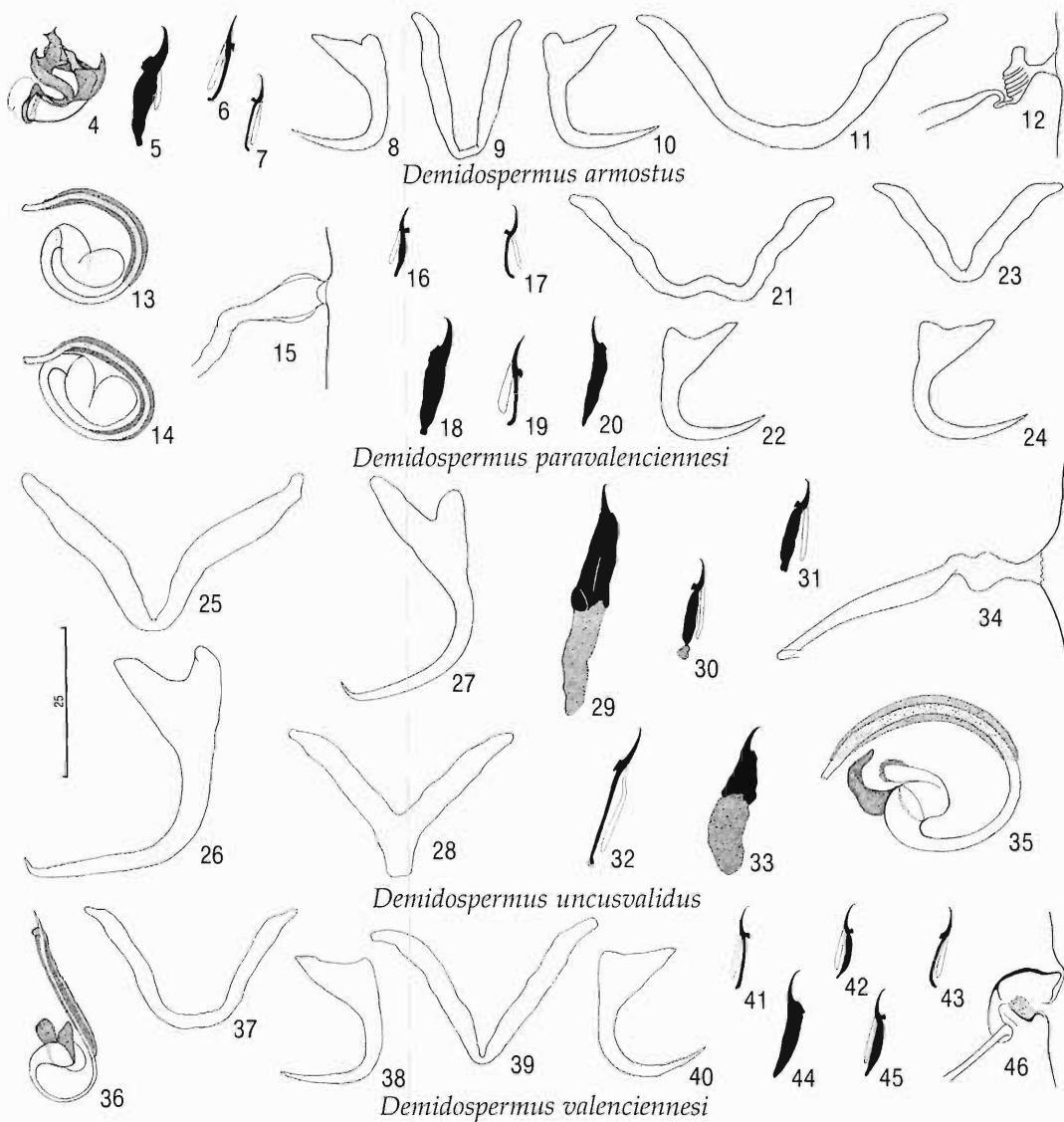
In a separate investigation of ecological aspects of parasitism on Argentine Siluriformes, Gutiérrez (unpubl.) found 22 specimens of *De-*

*midospermus armostus* on the gills of 10 of 44 *Pimelodus albicans*. These helminth specimens were not available for the current study.

***Demidospermus paravalenciennesi*  
Gutiérrez and Suriano, 1992  
(Figs. 2, 13–24)**

**HOST AND LOCALITY:** Gills of *Pimelodus clarias*: Río de la Plata near Buenos Aires, Argentina (28 February 1994; 24 March 1994).

**PREVIOUS RECORD:** *Pimelodus clarias*: Río de la Plata, Puerto de Buenos Aires, Argentina (Gutiérrez and Suriano, 1992).



**Figures 4–46.** Sclerotized structures of *Demidospermus* species. Figs. 4–12. *Demidospermus armostus* sp. n. 4. Copulatory complex (ventral). 5. Hook pair 1. 6. Hook pair 5 (typical of hook pairs 5, 6). 7. Hook pair 4 (typical of hook pairs 2–4, 7). 8. Dorsal anchor. 9. Dorsal bar. 10. Ventral anchor. 11. Ventral bar. 12. Vagina. Figs. 13–24. *Demidospermus paravaleceniensis* Gutiérrez and Suriano, 1992. 13, 14. Copulatory complexes (ventral). 15. Vagina. 16. Hook pair 2. 17. Hook pair 3 (typical of hook pairs 3, 4). 18. Hook pair 1. 19. Hook pair 5 (typical of hook pairs 5, 6). 20. Hook pair 7. 21. Ventral bar. 22. Ventral anchor. 23. Dorsal bar. 24. Dorsal anchor. Figs. 25–35. *Demidospermus uncusvalidus* Gutiérrez and Suriano, 1992. 25. Ventral bar. 26. Ventral anchor. 27. Dorsal anchor. 28. Dorsal bar. 29. Hook pair 1 (typical of hook pairs 1, 7). 30. Hook pair 4. 31. Hook pair 3. 32. Hook pair 5 (typical of hook pairs 5, 6). 33. Hook pair 2. 34. Vagina. 35. Copulatory complex (ventral). Figs. 36–46. *Demidospermus valenciennesi* Gutiérrez and Suriano, 1992. 36. Copulatory complex (ventral). 37. Ventral bar. 38. Ventral anchor. 39. Dorsal bar. 40. Dorsal anchor. 41. Hook pair 3 (typical of hook pairs 3, 4). 42. Hook pair 2. 43. Hook pair 5 (typical of hook pairs 5, 6). 44. Hook pair 1. 45. Hook pair 7. 46. Vagina. All drawings are to the 25- $\mu\text{m}$  scale.

SPECIMENS STUDIED: 30 vouchers, USNPC 87145, HWML 39347.

MEASUREMENTS: Body 254 (180–312;  $n = 20$ ) long; greatest width 81 (63–96;  $n = 22$ ). Pharynx 19 (16–22;  $n = 21$ ) in diameter. Haptor 78 (67–87;  $n = 21$ ) wide, 46 (39–54;  $n = 20$ ) long. Ventral anchor 20–21 ( $n = 7$ ) long, base 14 (13–15;  $n = 6$ ) wide; dorsal anchor 21 (20–22;  $n = 4$ ) long, base 12 (11–14;  $n = 4$ ) wide. Ventral bar 67 (60–80;  $n = 14$ ) long, distance between ends 47 (40–59;  $n = 24$ ); dorsal bar 52 (48–60;  $n = 9$ ) long, distance between ends 37 (31–42;  $n = 16$ ). Hook pair 1–21–22 ( $n = 11$ ) long, pair 2–12 (11–14;  $n = 4$ ) long, pairs 3–6–14–15 ( $n = 12$ ) long, pair 7–17–18 ( $n = 5$ ) long. MCO 63 (60–68;  $n = 7$ ) long, coiled; ring diameter 19 (16–21;  $n = 20$ ). Accessory piece 28 (25–30;  $n = 3$ ) long. Testis 45 (40–51;  $n = 6$ ) long, 24 (21–27;  $n = 6$ ) wide; ovary 34 (26–42;  $n = 12$ ) long, 21 (17–24;  $n = 11$ ) wide.

REMARKS: *Demidospermus paravalecienensis* was described from the same host and geographic locality as present specimens, and its original description is adequate (Gutiérrez and Suriano, 1992). In our specimens, the FH loops of hook pairs 1 and 7 were not observed (possibly absent), although 1 was shown by Gutiérrez and Suriano (1992) in their Figure 14a of hook pair 1. Gutiérrez and Suriano (1992) indicated that the prostatic reservoir was absent, but one was observed in current specimens.

***Demidospermus uncusvalidus***  
Gutiérrez and Suriano, 1992  
(Figs. 3, 25–35)

HOST AND LOCALITY: Gills of *Pimelodus clarias*: Río de la Plata near Buenos Aires, Argentina (28 February 1994; 24 March 1994).

PREVIOUS RECORDS: *Pimelodus clarias*: Río de la Plata, Puerto de Buenos Aires, Argentina (Gutiérrez and Suriano, 1992). *Parauchenipterus galeatus*: Río de la Plata, Puerto de Buenos Aires, Argentina (Gutiérrez and Suriano, 1992).

SPECIMENS STUDIED: 7 vouchers, USNPC 87148, HWML 39349.

MEASUREMENTS: Body 455 (378–532;  $n = 2$ ) long; greatest width 109 (87–132;  $n = 2$ ). Pharynx 25 (24–26;  $n = 2$ ) in diameter. Haptor 118 (117–120;  $n = 2$ ) wide, 85–86 ( $n = 2$ ) long. Ventral anchor 37 (35–38;  $n = 4$ ) long, base 20 (19–22;  $n = 4$ ) wide; dorsal anchor 39–40 ( $n = 3$ ) long, base 17 (15–18;  $n = 3$ ) wide. Ventral bar 64 (58–69;  $n = 4$ ) long; dorsal bar 45 (39–

49;  $n = 3$ ) long. Hook pairs 1, 7–43 (38–51;  $n = 8$ ) long, pair 2–28 (25–32;  $n = 3$ ) long, pair 3–17 ( $n = 4$ ) long, pair 4–20 ( $n = 1$ ) long, pairs 5, 6–25 (24–26;  $n = 4$ ) long. MCO 83 (75–90;  $n = 2$ ) long, coiled; ring diameter 22 (18–26;  $n = 3$ ). Accessory piece 28 (26–30;  $n = 2$ ) long. Testis 64 (56–72;  $n = 2$ ) long, 30 (27–33;  $n = 2$ ) wide; ovary 48 (41–55;  $n = 2$ ) long, 32 (31–33;  $n = 2$ ) wide.

REMARKS: *Demidospermus uncusvalidus*, *D. majusculus* sp. n., and *D. leptosynophallus* sp. n. appear related based on the comparative morphology of the haptoral sclerites. In these species, hook pairs 1, 2, and 7 have expanded shanks comprising 2 distinct regions, tips of the points of the dorsal and ventral anchors are recurved, and ventral bars are V shaped. *Demidospermus uncusvalidus* differs from *D. majusculus* by having a coiled MCO with 1 ring (J shaped in *D. majusculus*) and from *D. leptosynophallus* by having a broad posteromedial projection on the V-shaped dorsal bar (dorsal bar V shaped but lacking posteromedial projection in *D. leptosynophallus*).

The original description of *D. uncusvalidus* is adequate, and present specimens correspond both in size and morphology. Gutiérrez and Suriano (1992) reported this species from 2 hosts (*Pimelodus clarias* and *Parauchenipterus galeatus*) but did not designate a type host. Although stated in their paper that representative and type specimens were deposited in the Museo Nacional de Ciencias Naturales de Argentina and the Museum of the Institute of Zoology, Russian Academy of Sciences, St. Petersburg, these specimens were never forwarded for deposition (Gutiérrez, unpubl.). Since a holotype of *D. uncusvalidus* is apparently unavailable and Gutiérrez and Suriano (1992) listed *P. clarias* first in their host list, we consider this fish to be its type host. Our finding of *D. majusculus* and *D. leptosynophallus*, 2 species we initially considered conspecific with *D. uncusvalidus*, on different host species than that of *D. uncusvalidus* suggests that the worm population from *P. galeatus* might represent another related species. A reexamination of *P. galeatus* for species of *Demidospermus* is necessary to confirm the original host record.

***Demidospermus valenciennesi***  
Gutiérrez and Suriano, 1992  
(Figs. 36–46)

HOST AND LOCALITY: Gills of *Parapimelodus valenciennesi*: Río de la Plata near Buenos Ai-

res, Argentina (28 February 1994); Río Uruguay near Colón, Entre Ríos, Argentina (16 January 1994).

PREVIOUS RECORDS: *Parapimelodus valenciennesi*: Río de la Plata, Puerto de Buenos Aires, Argentina (Gutiérrez and Suriano, 1992).

SPECIMENS STUDIED: 34 vouchers, USNPC 87157, 87158, HWML 39354.

MEASUREMENTS: Body 246 (185–303;  $n = 12$ ) long; greatest width 91 (78–120;  $n = 10$ ). Pharynx 21 (16–24;  $n = 12$ ) in diameter. Haptor 70 (62–75;  $n = 12$ ) wide, 46 (41–52;  $n = 13$ ) long. Ventral anchor 23 (22–25;  $n = 8$ ) long, base 13 (12–14;  $n = 7$ ) wide; dorsal anchor 23 (22–24;  $n = 9$ ) long, base 12–13 ( $n = 9$ ) wide. Ventral bar 60 (50–68;  $n = 14$ ) long, distance between ends 42 (39–48;  $n = 15$ ); dorsal bar 55 (48–63;  $n = 11$ ) long, distance between ends 37 (28–42;  $n = 13$ ). Hook pair 1–19 (18–20;  $n = 9$ ) long, pairs 2–6–14 (13–15;  $n = 30$ ) long, pair 7–17 (16–18;  $n = 9$ ) long. MCO 58 (55–60;  $n = 3$ ) long, coiled, ring diameter 12 (11–13;  $n = 4$ ). Accessory piece 25 (23–28;  $n = 3$ ) long. Testis 54 (40–76;  $n = 11$ ) long, 32 (25–46;  $n = 10$ ) wide; ovary 32 (20–48;  $n = 11$ ) long, 29 (21–37;  $n = 10$ ) wide.

REMARKS: In *Demidospermus valenciennesi*, the dorsal bar is V shaped, and the ventral bar occurs as a broad U or W. Based on their drawings and description, Gutiérrez and Suriano (1992) clearly confused the dorsoventral orientation of the haptor and its sclerites; however, positions of the respective anchor/bar complexes were correctly depicted in their figure of the whole mount (a dorsal view). The dorsal and ventral anchors are morphologically similar, but the ventral anchor tends to be slightly larger in our specimens, suggesting that the original drawings of these structures were also reversed in Gutiérrez and Suriano (1992).

### *Demidospermus bidiverticulatum* (Suriano and Incorvaia, 1995) comb. n. (Figs. 47–56)

SYNONYM: *Paramphocleithrium bidiverticulatum* Suriano and Incorvaia, 1995.

HOSTS AND LOCALITIES: Gills of *Pimelodus clarias*: Río de la Plata near Buenos Aires, Argentina (28 February 1994; 24 March 1994). Gills of *Pimelodus albicans*: Río de la Plata near Buenos Aires, Argentina (24 March 1994).

PREVIOUS RECORD: *Pimelodus clarias macu-*

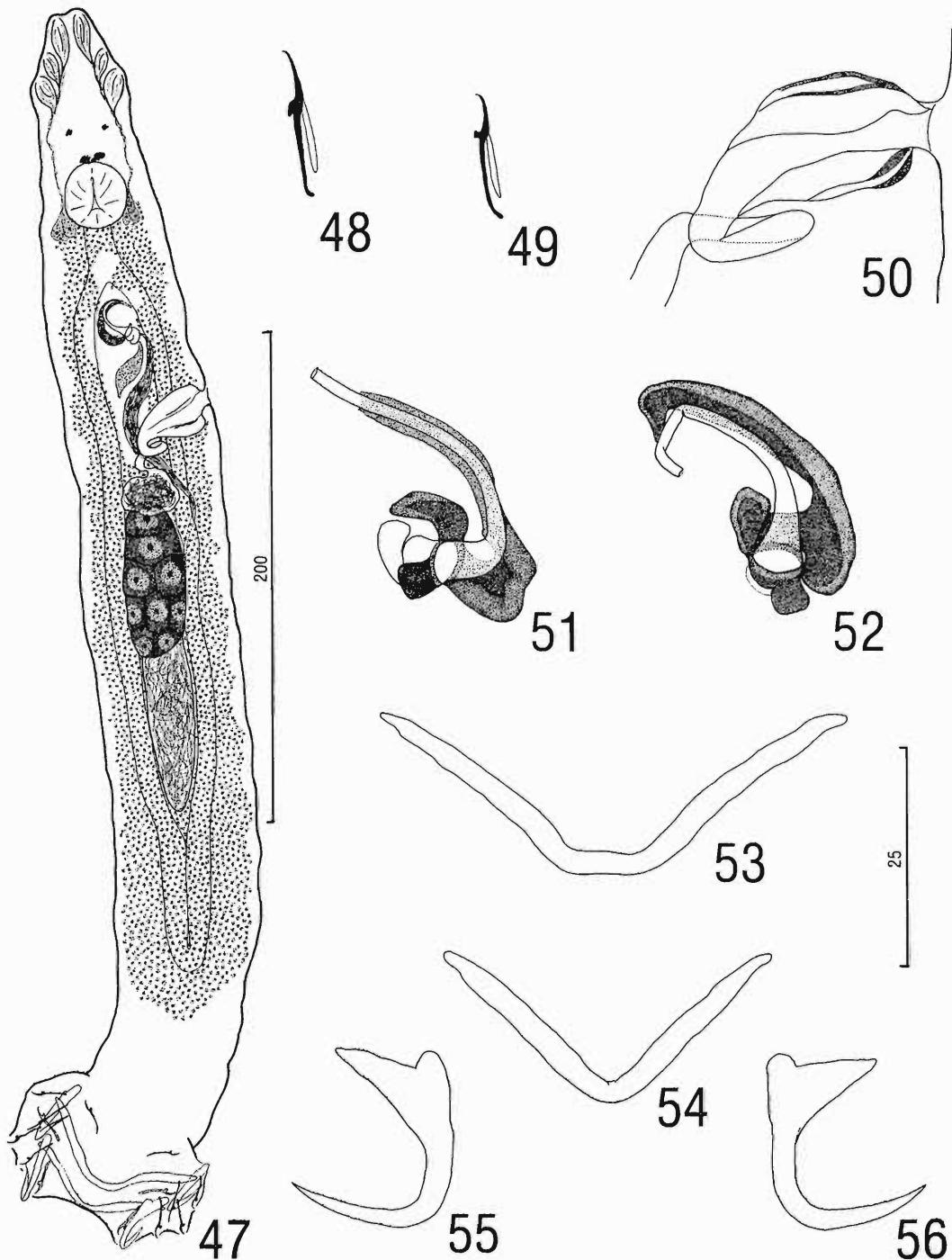
*latus*: Río de la Plata, Puerto de Buenos Aires, Argentina (Suriano and Incorvaia, 1995).

SPECIMENS STUDIED: 23 vouchers (from *P. clarias*), USNPC 87146, HWML 39348; 12 vouchers (from *P. albicans*), USNPC 87147.

MEASUREMENTS (dimensions of specimens from *P. albicans* are in brackets): Body 422 (340–510;  $n = 9$ ) [243 ( $n = 1$ )] long; greatest width 74 (62–84;  $n = 9$ ) [75 ( $n = 1$ )]. Pharynx 21 (19–23;  $n = 9$ ) [22 ( $n = 1$ )] in diameter. Haptor 83 (75–88;  $n = 6$ ) [79 ( $n = 1$ )] wide, 61 (49–75;  $n = 9$ ) [43 ( $n = 1$ )] long. Ventral anchor 23 (22–24;  $n = 9$ ) [23 (21–24;  $n = 7$ )] long, base 14 (12–15;  $n = 9$ ) [13–14 ( $n = 7$ )] wide; dorsal anchor 22 (21–24;  $n = 10$ ) [23 (22–24;  $n = 10$ )] long, base 13 (12–14;  $n = 9$ ) [13 (12–14;  $n = 10$ )] wide. Ventral bar 73 (68–78;  $n = 8$ ) [72 (70–78;  $n = 8$ )] long, distance between ends 55 (47–66;  $n = 9$ ) [50 (42–60;  $n = 10$ )]; dorsal bar 60 (55–65;  $n = 8$ ) [61 (58–68;  $n = 7$ )] long, distance between ends 42 (36–49;  $n = 9$ ) [46 (41–50;  $n = 9$ )] wide. Hook pairs 1, 3–7–16 (14–18;  $n = 32$ ) [16 (14–17;  $n = 27$ )] long, pair 2–12–13 ( $n = 7$ ) [12–13 ( $n = 5$ )] long. MCO 45 (40–53;  $n = 9$ ) [47 (44–48;  $n = 4$ )] long, J shaped; accessory piece 34 (31–39;  $n = 3$ ) [35 (30–41;  $n = 6$ )] long. Testis 48 (31–65;  $n = 7$ ) [28 ( $n = 1$ )] long, 23 (17–29;  $n = 7$ ) [27 ( $n = 1$ )] wide; ovary 41 (27–51;  $n = 9$ ) [27 ( $n = 1$ )] long, 23 (20–25;  $n = 9$ ) [24 ( $n = 1$ )] wide.

REMARKS: Our finding of *Demidospermus bidiverticulatum* on *Pimelodus albicans* is a new host record. Specimens from this host were highly contracted, apparently a result of premature fixation while worms were still alive. Contraction is reflected in the comparatively shorter lengths of the body and gonads in specimens from *P. albicans* when compared to respective measurements of worms from *P. clarias*.

Based on comparative haptoral morphology, *Demidospermus bidiverticulatum* most closely resembles *D. anus* Suriano, 1983. It differs from this species by possessing an MCO comprising less than 1 complete ring (about 1.5 rings in *D. anus*). The ventral and dorsal bars were incorrectly labeled in the plate of figures of *D. bidiverticulatum* presented by Suriano and Incorvaia (1995) in that the ventral bar (identified as the dorsal bar in Suriano and Incorvaia's [1995] Figure 26) is U or W shaped and the dorsal bar (Figure 27, ventral bar in Suriano and Incorvaia [1995]) is V shaped.



Figures 47–56. *Demidospermus bidiverticulatum* (Suriano and Incorvaia, 1995) comb. n. 47. Whole mount (composite, ventral). 48. Hook pair 6 (typical of hook pairs 5, 6). 49. Hook pair 7 (typical of hook pairs 1–4, 7). 50. Vagina. 51, 52. Copulatory complexes (ventral). 53. Ventral bar. 54. Dorsal bar. 55. Ventral anchor. 56. Dorsal anchor. All figures are to the same scale (25- $\mu$ m) except Figure 47 (200- $\mu$ m).

***Demidospermus cornicinus* sp. n.**  
**(Figs. 57–67)**

HOST AND LOCALITY: Gills of *Iheringichthys westermanni*: Río de la Plata near Buenos Aires, Argentina (28 February 1994).

SPECIMENS STUDIED: Holotype, USNPC 87155; 30 paratypes (on 28 slides), USNPC 87156, HWML 39353, MACN 34117/A27.

DESCRIPTION: Body 447 (295–571;  $n = 14$ ) long, fusiform; greatest width 96 (71–112;  $n = 13$ ) in posterior trunk. Cephalic margin narrow; cephalic lobes moderately developed. Eyes 4; posterior pair larger, closer together than anterior pair; accessory granules uncommon in cephalic, anterior trunk regions. Pharynx spherical, 28 (25–30;  $n = 15$ ) in diameter; esophagus moderately long. Peduncle broad; haptor subhexagonal, 89 (78–100;  $n = 15$ ) wide, 70 (48–85;  $n = 15$ ) long; bilateral posterior glandular patches small, indistinct. Anchors similar, each with poorly differentiated roots, short shaft, elongate point; ventral anchor 24 (23–26;  $n = 6$ ) long, base 16 (14–18;  $n = 5$ ) wide; dorsal anchor 24 (23–25;  $n = 5$ ) long, base 15 (14–16;  $n = 4$ ) wide. Ventral bar 75 (65–90;  $n = 12$ ) long, U shaped, ends directed laterally; distance between ends 55 (43–76;  $n = 16$ ). Dorsal bar 63 (58–70;  $n = 7$ ) long, V shaped; distance between ends 40 (32–46;  $n = 14$ ). Hook pair 1–24 (21–26;  $n = 8$ ) long; pair 2–12–13 ( $n = 6$ ) long; pairs 3–7–16 (15–18;  $n = 12$ ) long; hook pair 1 with recurved point, heavy shaft, flattened thumb, inflated shank tapering proximally, apparently lacking FH loop; pair 2 with protruding thumb, slightly expanded shank, FH loop shank length; pairs 3, 4, 7 with protruding thumb, slender shank, FH loop shank length; pairs 5, 6 with small flattened thumb, delicate shank, FH loop about 3/4 shank length. MCO 62 (53–68;  $n = 12$ ) long, an incomplete ring, frequently appearing J shaped, with flared termination; base with lightly sclerotized margin; proximal double bag small, delicate; coil diameter 18 (14–21;  $n = 14$ ). Accessory piece 27 (21–34;  $n = 9$ ) long, comprising variable sheath enclosing distal shaft of MCO. Gonads ovate. Testis 61 (34–77;  $n = 8$ ) long, 40 (28–56;  $n = 8$ ) wide; seminal vesicle sigmoid; prosthetic reservoir not observed. Ovary 49 (38–60;  $n = 3$ ) long, 29 (23–38;  $n = 3$ ) wide; oviduct, ootype not observed. Vaginal aperture midway between ovary, copulatory complex;

vaginal vestibule complex with sclerotized ridges; seminal receptacle small; vitellaria dense.

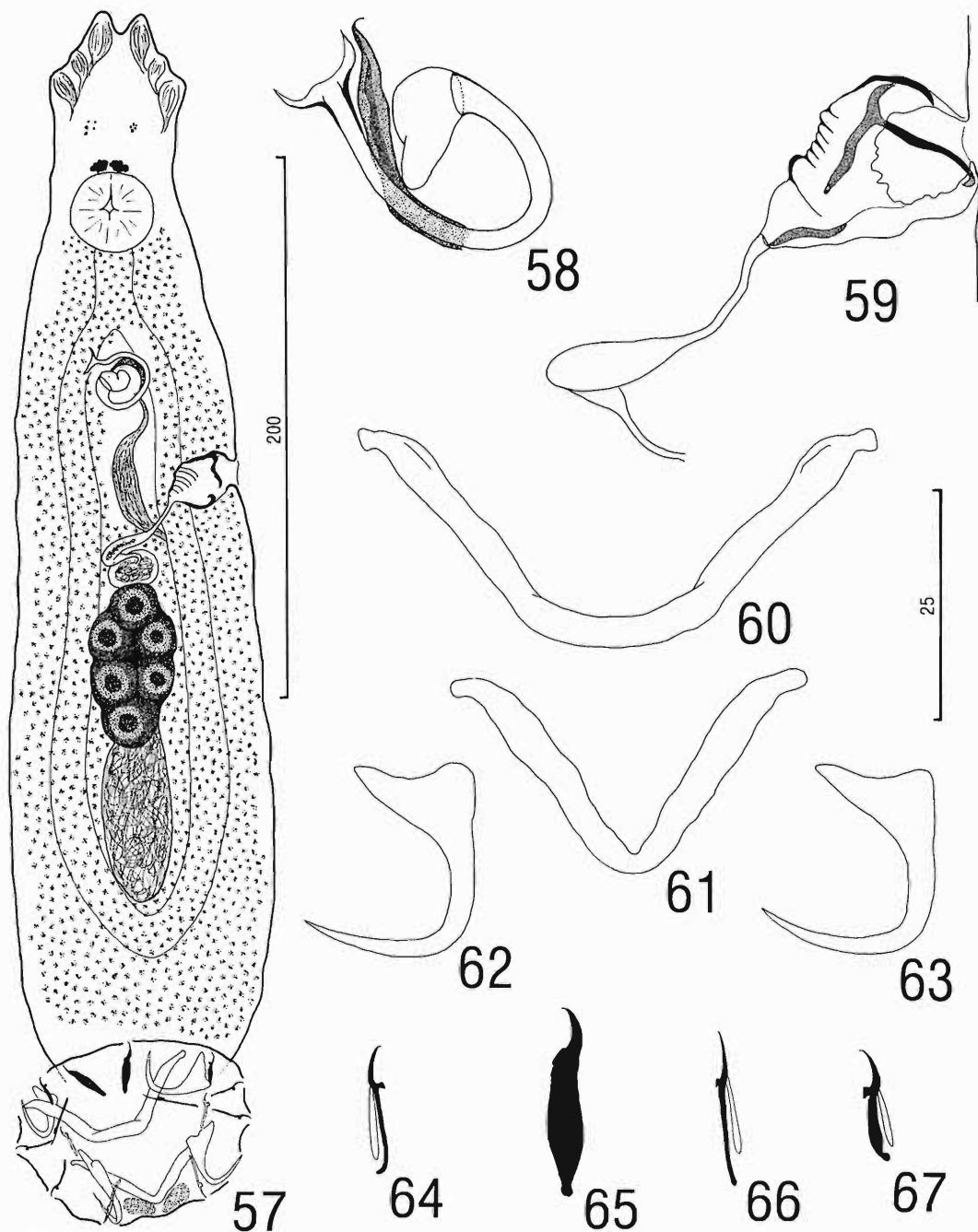
REMARKS: This species resembles *Demidospermus paravalenciennesi* based on comparative haptoral morphology. It differs from *D. paravalenciennesi* by lacking an expanded shank on hook pair 7 and by possessing a flared termination of the MCO. The specific name is from Latin (*cornicinus* = having or a blower of a trumpet) and refers to the termination of the MCO.

***Demidospermus idolus* sp. n.**  
**(Figs. 68–77)**

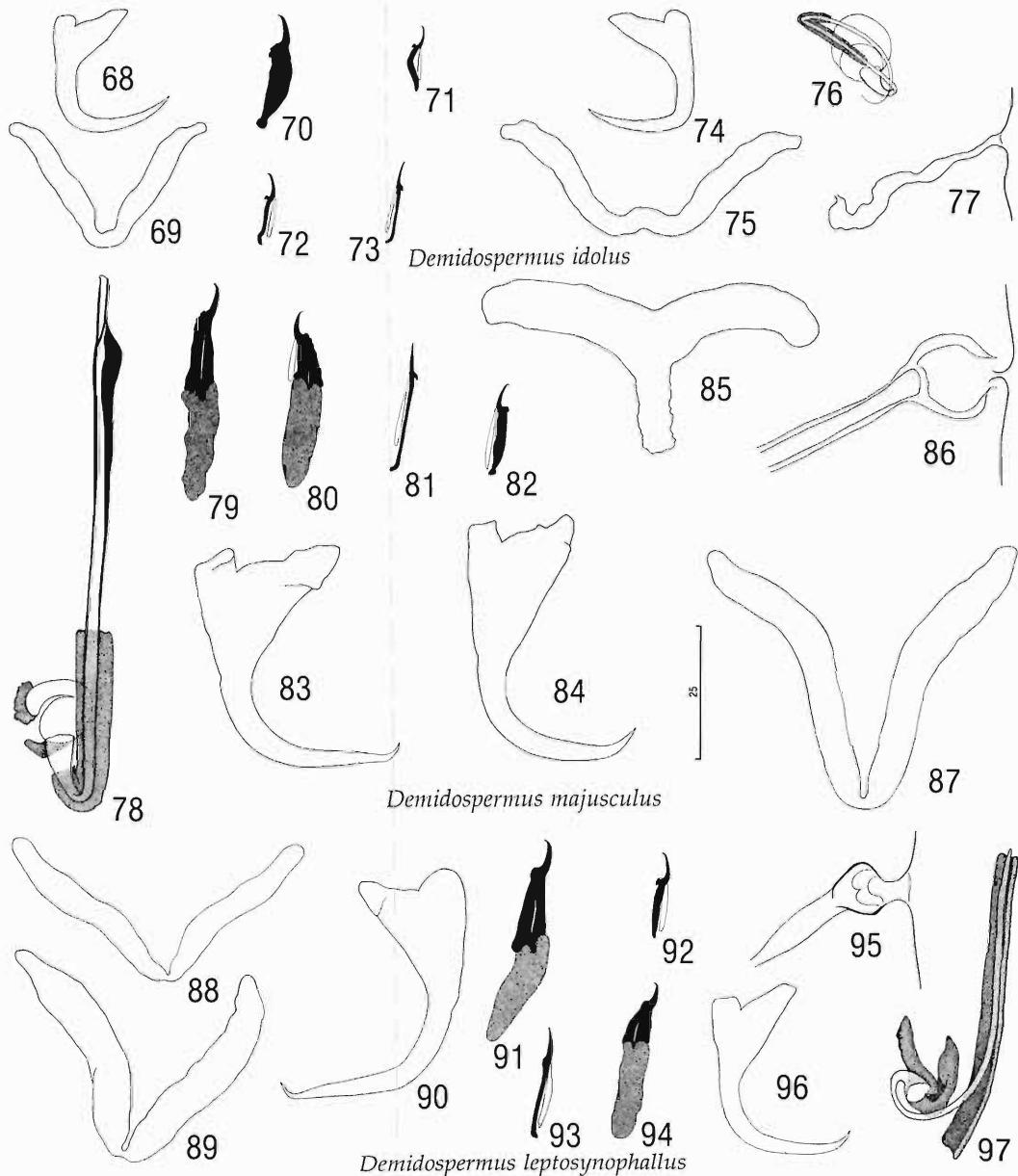
HOST AND LOCALITY: Gills of *Pimelodus albicans*: Río de la Plata near Buenos Aires, Argentina (24 March 1994).

SPECIMENS STUDIED: Holotype, USNPC 87151; 9 paratypes, USNPC 87152, HWML 39351, MACN 34115/A27.

DESCRIPTION: Body 215 (196–236;  $n = 3$ ) long, robust; greatest width 104 (96–108;  $n = 3$ ) near midlength. Cephalic margin rounded; cephalic lobes poorly developed. Eyes 4; posterior pair tangent, larger than anterior pair; accessory granules uncommon in cephalic, anterior trunk regions. Pharynx spherical, 23 ( $n = 3$ ) in diameter; esophagus short. Peduncle broad; haptor subhexagonal, 89 (85–91;  $n = 3$ ) wide, 49 (44–51;  $n = 3$ ) long; 2 posterior bilateral glandular patches present. Anchors similar; each with differentiated roots (superficial root longer), short shaft, elongate point; ventral anchor 24 (22–25;  $n = 7$ ) long, base 15 (14–16;  $n = 7$ ) wide; dorsal anchor 23 (22–25;  $n = 5$ ) long, base 16 (14–17;  $n = 5$ ) wide. Ventral bar 76 (70–80;  $n = 6$ ) long, W shaped, with ends directed laterally; distance between ends 56 (44–64;  $n = 9$ ). Dorsal bar 61 (60–63;  $n = 4$ ) long, V shaped; distance between ends 42 (36–46;  $n = 6$ ). Hook pair 1–23–24 ( $n = 7$ ) long, with recurved point, stout shaft, broad flattened thumb, expanded shank tapering proximally, lacking FH loop; pair 2–12–13 ( $n = 4$ ) long, with erect thumb, slightly inflated shank; pairs 3, 4, 7 with erect thumb, slender shank; pairs 5, 6 with flattened thumb, slender shank; pairs 3–7–16 (15–17;  $n = 16$ ) long, FH loop about shank length. MCO 83 ( $n = 1$ ) long, a coil of 1 ring poorly defined, base lacking sclerotized margin; coil diameter 25 (20–30;  $n = 9$ ). Accessory piece a simple sleeve surrounding 1/3 of MCO shaft. Testis 38 (33–42;  $n = 3$ ) long, 27 (22–31;  $n = 3$ ) wide, ovate; sem-



Figures 57–67. *Demidospermus cornicinus* sp. n. 57. Whole mount (composite, ventral). 58. Copulatory complex (dorsal). 59. Vagina. 60. Ventral bar. 61. Dorsal bar. 62. Ventral anchor. 63. Dorsal anchor. 64. Hook pair 4 (typical of hook pairs 3, 4, 7). 65. Hook pair 1. 66. Hook pair 5 (typical of hook pairs 5, 6). 67. Hook pair 2. All figures are to the same scale (25- $\mu\text{m}$ ) except Figure 57 (200- $\mu\text{m}$ ).



**Figures 68–97.** Sclerotized structures of *Demidospermus* species. Figs. 68–77. *Demidospermus idolus* sp. n. 68. Dorsal anchor. 69. Dorsal bar. 70. Hook pair 1. 71. Hook pair 2. 72. Hook pair 3 (typical of hook pairs 3, 4, 7). 73. Hook pair 5 (typical of hook pairs 5, 6). 74. Ventral anchor. 75. Ventral bar. 76. Copulatory complex (ventral). 77. Vagina. Figs. 78–87. *Demidospermus majusculus* sp. n. 78. Copulatory complex (ventral). 79. Hook pair 1 (typical of hook pairs 1, 7). 80. Hook pair 2. 81. Hook pair 5 (typical of hook pairs 5, 6). 82. Hook pair 3 (typical of hook pairs 3, 4). 83. Ventral anchor. 84. Dorsal anchor. 85. Dorsal bar. 86. Vagina. 87. Ventral bar. Figs. 88–97. *Demidospermus leptosynophallus* sp. n. 88. Ventral bar. 89. Dorsal bar. 90. Ventral anchor. 91. Hook pair 1 (typical of hook pairs 1, 7). 92. Hook pair 4 (typical of hook pairs 3, 4). 93. Hook pair 6 (typical of hook pairs 5, 6). 94. Hook pair 2. 95. Vagina. 96. Dorsal anchor. 97. Copulatory complex (ventral). All drawings are to the 25- $\mu\text{m}$  scale.

inal vesicle sigmoid; 2 prostatic reservoirs saccate. Ovary subspherical, 29 (25–33;  $n = 3$ ) long, 26 (25–28;  $n = 3$ ) wide; oviduct, ootype not observed; vagina simple, lacking vestibule, opening at level of copulatory complex; seminal receptacle transversely ovate; vitellaria dense.

**REMARKS:** Specimens of *Demidospermus idolus* were contracted, apparently a result of premature fixation after collection. This species is similar to *D. valenciennesi* and *D. cornicinus* based on the comparative morphology of the haptoral sclerites. It differs from *D. valenciennesi* by having a more robust hook pair 1 and by lacking a vaginal vestibule and an inflated shank in hook pair 7. It is distinguished from *D. cornicinus* by lacking a flared termination of the MCO. The species name is from Greek (*eidolon* = an image or phantom) and reflects the similarity of the species with its congeners.

***Demidospermus majusculus* sp. n.  
(Figs. 78–87)**

**HOST AND LOCALITY:** Gills of *Pimelodus albicans*: Río de la Plata near Buenos Aires, Argentina (24 March 1994).

**SPECIMENS STUDIED:** Holotype, USNPC 87153; 12 paratypes, USNPC 87154, HWML 39352, MACN 34116/A27.

**DESCRIPTION:** Body 493 (420–627;  $n = 3$ ) long, robust, fusiform; greatest width 211 (185–232;  $n = 3$ ) near midlength or in posterior trunk. Cephalic margin rounded; lobes poorly developed. Eyes 4; posterior pair tangent; anterior eyes widely separated; accessory granules frequent in cephalic, anterior trunk regions. Pharynx spherical, 46 (41–51;  $n = 3$ ) in diameter; esophagus short. Peduncle broad; haptor subhexagonal, 144 (136–154;  $n = 3$ ) wide, 93 (86–99;  $n = 3$ ) long; glandular patches not observed. Ventral anchor 42 (39–45;  $n = 7$ ) long, with short roots, short shaft, tip of point recurved; base 27 (24–30;  $n = 5$ ) wide. Dorsal anchor 47 (45–49;  $n = 5$ ) long, with short roots, short shaft, tip of point slightly recurved; base 23 (22–24;  $n = 2$ ) wide. Ventral bar 96 (93–100;  $n = 4$ ) long, V shaped; distance between ends 53 (46–69;  $n = 7$ ). Dorsal bar broadly V shaped, with rectangular posteromedial process; distance between ends 62 (50–75;  $n = 10$ ). Hook pairs 1, 7–44 (38–47;  $n = 11$ ) long, with recurved point, broad flattened thumb, expanded shank comprising 2 subunits, lacking FH loop; pair 2–30 (22–34;  $n = 7$ ) long, similar to pairs 1, 7

except FH loop reaching junction of shank subunits; pairs 3, 4–20 (19–21;  $n = 10$ ) long, with slightly expanded shank, FH loop about shank length; pairs 5, 6–25 (24–27;  $n = 7$ ) long, with flattened thumb, thin shank, FH loop 3/4 shank length. MCO 123 (113–133;  $n = 8$ ) long, J shaped, with subterminal heavy sclerotization of the wall of the tube; margin of base delicate; proximal basal bags lightly sclerotized. Accessory piece 43 (34–49;  $n = 5$ ) long, a sheath enclosing about 1/3 of MCO shaft. Testis 124 (101–147;  $n = 3$ ) long, 84 (72–102;  $n = 3$ ) wide, ovate; seminal vesicle sigmoid; 1 prostatic reservoir saccate. Ovary transversely ovate, 49 (39–59;  $n = 3$ ) long, 68 (58–77;  $n = 3$ ) wide; oviduct, ootype not observed; vagina simple, with thick-walled vestibule, aperture near level of copulatory complex; seminal receptacle transversely ovate; vitellaria dense.

**REMARKS:** All specimens available for study were contracted. Characters differentiating this species from its apparent relatives, *Demidospermus uncusvalidus* and *D. leptosynophallus*, are given in the remarks for *D. uncusvalidus*. The specific name is from Latin (*majusculus* = somewhat larger) and refers to the size of this helminth compared with its congeners.

***Demidospermus leptosynophallus* sp. n.  
(Figs. 88–97)**

**HOST AND LOCALITY:** Gills of *Iheringichthys westermanni*: Río de la Plata near Buenos Aires, Argentina (28 February 1994).

**SPECIMENS STUDIED:** Holotype, USNPC 87149; 15 paratypes, USNPC 87150, HWML 39350, MACN 34114/A27.

**DESCRIPTION:** Body 494 (405–648;  $n = 5$ ) long, robust, fusiform; greatest width 142 (122–163;  $n = 4$ ) in posterior or anterior trunk. Cephalic margin rounded; lobes poorly developed. Eyes 4, eye granules infrequently dispersed; posterior pair large, proximate; anterior pair small, widely separated. Pharynx spherical, 37 (34–40;  $n = 5$ ) in diameter; esophagus short. Peduncle broad; haptor subhexagonal, 119 (114–130;  $n = 5$ ) wide, 90 (75–111;  $n = 6$ ) long; bilateral glandular patches not observed. Ventral anchor 40 (34–44;  $n = 7$ ) long, with short roots, short shaft, tip of point recurved; base 21 (19–23;  $n = 6$ ) wide. Dorsal anchor 38 (35–41;  $n = 9$ ) long, with short roots, short shaft, tip of point slightly recurved; base 19 (18–20;  $n = 4$ ) wide. Bars V shaped; ventral bar 85

(80–90;  $n = 4$ ) long, distance between ends 53 (40–67;  $n = 9$ ); dorsal bar 69 (63–78;  $n = 7$ ) long, distance between ends 47 (38–56;  $n = 10$ ). Hook pairs 1, 2, 7 with recurved point, broad flattened thumb, dilated shank comprising 2 sub-units, apparently lacking FH loop; pairs 1, 7–42 (39–46;  $n = 13$ ) long; pair 2–32 (31–33;  $n = 7$ ) long. Hook pairs 3, 4–17 (16–18;  $n = 13$ ) long, with slightly inflated shank, erect thumb, FH loop about shank length; hook pairs 5, 6–23 (22–25;  $n = 9$ ) long, with flattened thumb, thin shank, FH loop about shank length. MCO coiled forming incomplete ring, frequently appearing J shaped; base with delicate margin, 2 sclerotized flaps; proximal bags not observed; MCO 86 (75–95;  $n = 7$ ) long, ring diameter 20–21 ( $n = 3$ ). Accessory piece 63 (62–65;  $n = 2$ ) long, comprising sleeve enclosing distal MCO shaft. Testis 85 (71–103;  $n = 3$ ) long, 36 ( $n = 2$ ) wide, ovate; seminal vesicle sigmoid; 1 prostatic reservoir saccate. Ovary subspherical, 45 (38–57;  $n = 5$ ) long, 37 (31–42;  $n = 5$ ) wide; oviduct, ootype, seminal receptacle not observed; vagina with small vestibule, aperture midway between level of ovary, copulatory complex; vitellaria dense. Egg 95 (91–100;  $n = 2$ ) long, 71 (70–72;  $n = 2$ ) wide, ovate, with one side slightly flattened; proximal filament a short knob.

**REMARKS:** This species is most similar to *Demidospermus majusculus* based on the comparative morphology of the haptoral armament and vagina. It differs from *D. majusculus* by lacking a posteromedial projection on the dorsal bar and by lacking a subterminal thickening of the wall of the MCO. The specific name is from Greek (*leptosyne* = slenderness + *phallos* = penis) and refers to the male copulatory organ.

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